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MACHINE TOOLS AND METALWORKING EQUIPMENT

No. 4

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SOVIET HEAVY ENGINEERING INDUSTRY: NEW MACHINERY

Moscow SOVIET REPORT in English No 2, 1982 pp 3-6

[Text]

The Soviet heavy and transport engineering industry consists of six formidable and self-contained subdivisions: metallurgical, mining, hoisting-and-transport engineering, diesel locomotive, railway-car and diesel-engine manufacturing. Our numerous enterprises produce equipment for the ferrous and non-ferrous metallurgy, coal and ore-mining, chemical, oil and gas industries. In other words, we make equipment vital for technological progress in many leading branches of our national economy.

It would take much time and space to enumerate all the large enterprises of the industry. So I'll limit myself to mentioning giants known far beyond our country: the Uralmash industrial amalgamation, the Novokramatorsky Engineering Plant, the Bryansk Engineering Plant, the Voroshilovgrad Diesel Locomotive Plant, the Kolomna Factory, Zhdanovtyazhmash, Elektrostaltyazhmash...

The industry employs 60,000 researchers, designers and product engineers, and runs tens of research institutes and specialised design bureaus, including the All-Union R&D institutes of metallurgical, heavy, foundry, mining and hoisting-and-transport engineering—large organisations of national and international importance.

Our heavy engineering industry enterprises produce equipment which can be best described as unique. These include powerful walking excavators, fully automated rolling mills, drilling rigs for sinking super-deep boreholes, super-powerful presses, and so on, and so forth. Many of the machines we make are the only ones of their kind in the world.

We pursue a technical policy of increasing the unit power of machines, making them more reliable and lenghtening their service life while reducing their dimensions, weight, their actual and specific metal content. **In 1976—1980 alone, more than 1,000 machines and equipment items of new types went into quantity production.**

An important trend of our work is that of setting up large machine complexes to replace groups of separate machines, and making it possible to comprehensively mechanise production processes and cycles in metallurgy, mining, transport and in other industries.

INCREASING THE OUTPUT OF HIGH-QUALITY METAL

Metallurgical engineering is a traditional subdivision of the heavy engineering indus-

try. And in it new methods have of late been developed of making metal and articles thereof. In particular, the oxygen steelmaking process, involving extra-furnace degassing and continuous casting, is coming into ever broader use. Bottom-blown 250 ton converters are being manufactured. Extra-furnace degassing units with the dipper capacity of 130 tons will be used to improve the quality of steel.

The Zhdanovtyazhmash industrial amalgamation has launched the quantity production of 400 ton oxygen converters. Two of them can make five million tons of metal a year. This is more than double the output capacity of even the biggest of their predecessors. Besides, the new converters can operate at an accelerated rate, producing 35 rather than 25 portions of metal a day.

Continuous steel casting units are used in making rolled steel blanks. A revolutionary feature of this technique is the moulding of ingots on a vertical rather than horizontal plane. This improves the quality and structure of ingots and reduces waste. The record of such machines' operation at Soviet metallurgical plants shows that each of them actually produces over one million tons of ingots a year instead of the rated 800,000 tons. The new machines reduce slab costs by 10—12% and raise labour productivity by 28%.

The Uralmash industrial amalgamation has developed two-stand curvilinear and radial continuous billet-casting machines producing slabs from 200 to 1,900 mm wide. The output of these machines is growing at a rapid pace.

The output of molten steel degassing units is to increase too: degassing improves steel quality considerably. The first units for the argon-oxygen refining of molten steel will be built to sharply boost output in electric furnace shops. And for powder metallurgy the production is being launched of metal-sputtering equipment.

Specialists of the metallurgical engineering institute have found, and put to use, an entirely new method of transverse screw and wedge rolling. Special rolling mills developed on the basis of this method produce components and precision billets which are strong, durable, worked to close tolerances and fit for immediate finish-machining (if they need it at all). These billets can be machined into practically any body of revolution ranging from bicycle wheel bosses to railway car axles. The new method means a much higher labour productivity and a 20 to 30% saving of metal.

Such a mill, manufactured by the Elektrostaltyazhmash industrial amalgamation, is already in operation at the Dnepropetrovsk metallurgical plant. Fully automated, it produces hollow car axles.

Another new development is a three-high screw blooming mill. It works rolled stock, and even rolling waste, into round parts of pre-set dimensions. Designers are now thinking of ways to combine this process with horizontal continuous casting machines.

The 2000 strip mill manufactured by the Novokramatorsky Plant surpasses the best foreign makes in its productivity (6.5 million tons of high-quality steel sheet a year).

HIGH-POWER MINING EQUIPMENT

Among other things, the heavy engineering industry produces highly-efficient and reliable mining equipment.

The Uralmash plant manufactures the world's biggest ESh-100/100 walking excavators with a 100 m^3 bucket and a boom 100 m long. This excavator shifts 180 tons of rock to a distance of 200 m in just one minute. Productivity is over 16 million m^3 of rock a year. The EKG-20 excavators with a 20 m^3 bucket capacity are efficiently performing in the Neryungri opencast colliery. These frostproof machines are not affected even if temperatures are down to –60 °C.

The Soviet heavy engineering industry has developed rotary excavators with capacities ranging from 630 to 5,000 m^3/h. They make it possible to comprehensively mechanise all the processes in a coal mine, from extraction to loading into railway cars. Siberia's opencast collieries are being equipped with Novokramatorsky rotary com-

plexes with a capacity of 5,000 m^3/h; they can handle two trainloads of coal in an hour. Still more efficient complexes with a capacity of up to 12,000 m^3/h are being developed.

The Uralmash industrial amalgamation has developed, and is now quantity producing the EUK-3000 package drilling rigs capable of drilling cluster of 10—16 inclined wells.

The same amalgamation has come up with the unique Uralmash-15000 drilling rig which can sink boreholes as deep as 15 km. Now such rigs are used for drilling two exploratory holes—one in the Kola Peninsula, and the other in Azerbaijan. In the north, they have already bored a hole about 12,000 m deep through hard crystallic rock. As a result, scientists have obtained new and valuable data about the structure of the earth's crust.

The construction of the Krasnoyarsk heavy excavator factory is of vital importance for the development of mining engineering. The plant's first section alone will produce eight dragline excavators with 40 m^3 buckets and sixty excavators with 20 m^3 buckets a year. Besides, rotary complexes will be assembled there. The first phase of the plant is to go into operation before this year is out.

The ore-mining mills of the ferrous and non-ferrous metallurgy industry are equipped with new cone crushers of 1,100 m^3/h capacity, ball mills with 200 m^3 drums, 300 m^3 ore pebble mills and floatation machines with chambers of up to 12 m^3. Electromagnetic separators with a capacity of 100 t/h for dressing weakly magnetic highly oxidized ores have been developed and are now undergoing trials. Roasting machines with sintering areas of 306 and 520 m^2, developed by the Uralmash industrial amalgamation, are functioning at a number of ore-dressing mills.

Hoisting Cranes of 3,000 Types

Our industry manufactures all sorts of equipment for the mechanisation of hoisting and transportation work: remote-controlled travelling cranes, gantry cranes, overhead pushing conveyors, automatic stackers, manipulators, escalators and overhead ropeway gears.

The novelties include a unique travelling crane for mines with a lifting capacity of 40 tons and a stroke of 600m. Altogether, the industry produces cranes of over 3,000 modifications.

Our research institutes are working continuously to develop more efficient manipulators. Recently, the All-Union Hoisting and Transport Institute has designed a manipulator for transferring components of up to 160kg from a continuous conveyor to a numerically-controlled machine tool. Depending on operation mode, the speed of the manipulator's arm movement can be varied from 2 cm to 4 m a second.

HIGH QUALITY, RELIABILITY, LONG SERVICE LIFE

The heavy engineering industry is among the most advanced and fastest-growing branches of the Soviet national economy. **Over the period of 1976—1980, its output grew by 22.4%.** Our industry is one of the country's leading exporters of engineering products. Machines manufactured by our factories are doing efficient work in more than 80 countries.

High technical standards, reliability and long service life are features built into our machines back at the research and development stage. The ideas of our designers are embodied in metal at our factories fitted out with the latest equipment and using the latest production processes. The share of stamping—the most advanced method of die casting—constitutes 35% at our heavy engineering enterprises. Gas-shielded, flux, electroslag and resistance welding are common practice. Installations for the automatic plasma cutting of rolled stock and plasma working of steel castings are introduced. Many heavy engineering plants employ sets of electroslag and vacuum arc remelting furnaces which ensure a much better quality of the metal. Billet production by precision casting methods and self-hardening sand mould casting are widely used. Powerful industrial lasers are being developed for manufacturing processes. Automation of machining processes is being promoted in every way.

In a word, the workers of the Soviet heavy engineering industry are sparing no efforts to guarantee that their products invariably meet the highest modern standards.

CSO: 1812/97

ALLOCATION OF FUNDS TO MACHINEBUILDING, METALWORKING ENTERPRISES ANALYZED

Moscow VESTNIK STATISTIKI in Russian No 12, Dec 82 pp 49-53

[Article by A. Popov, candidate of economic science, senior scientific associate, Economics Institute, Ural Scientific Center: "Analysis of Capital Output Ratio at Enterprises in the Machinebuilding and Metalworking Sectors"

[Text] The problem of the better use of fixed productive capital has always been and still remains very urgent. The years of the Ninth and Tenth Five-Year Plans were characterized by somewhat of a reduction in the capital output ratio. This is especially supported by the data in Table 1.[1]

Table 1. Dynamics of Capital Output Ratios and Labor Productivity in the Machine Building and Metal Working Sectors of Chelyabinsk Oblast. (1980 as Percent of 1970).

Sector	Capital output ratio	Labor productivity
Machine building and Metal working in general	71	137
Including:		
Mining and ore processing machines	102	166
Lift and Transportation machines	113	140
Chemical industry machinery	137	221
Machine tool building and instrument industry	92	129
Instrument building	98	205
Motor vehicle industry	78	146
Tractor and agricultural machinery	47	108
Construction and road machinery	90	152

Undoubtedly, the decline in the capital output ratios (COR) in some industries is no basis for asserting that production efficiency has dropped, since the latter is also determined by the growth in the productivity of direct labor.

This indicator, as is apparent from Table 1, is steadily growing. This is a counteracting factor (naturally within definite limits) to the declining capital output ratio.[2]

In some sectors the increased output-capital ratio (the inverse of the COR) is a sign of intensive development in their technical base: as a result of accelerated growth rates in the machine-worker ratio, the capital-labor ratio is growing more rapidly than labor productivity, leading to a reduction in the COR. This same idea can be expressed somewhat differently. The comparatively low level of the COR indicator at enterprises with high labor productivity is due to the fact that these enterprises have had much greater success than others in implementing engineering decisions which replace human productive functions.

However, not all reductions in the capital-output ratio are justified. Frequently its level declines because of delays in the introduction of planned capacity, the insufficient use of labor and material resources, and other reasons. This, in its turn, is evidence of the necessity for the more detailed analysis of the capital-output ratio, and for the management of the development and utilization of fixed production capital [FPC] at the sector (enterprise, and association) level.

A collective of associates at the Chelyabinsk Polytechnic Institute and the Economics Institute at the Ural Scientific Center of the USSR Academy of Sciences has suggested a methodology for analyzing the capital-output ratio in sectors characterized by discrete (discontinuous) production.[3] It primarily consists in representing the COR indicator in the following fo form: (For an explanation of symbols, see Table 2.)

$$COR = \frac{G}{N} \cdot \frac{N}{P} \cdot \frac{C_e}{C_{ie}} \cdot \frac{C_{ie}}{C_{fpc}} = C_m \cdot ov \cdot r \cdot Sh \cdot a$$

Table 2. Initial Data for the Analysis of the Capital-Output Ratio in Machine Building and Metal Working Sectors in Chelyabinsk Oblast (In relative units)

Indicator	Symbol	Base (1970)	Report (1980)	Report as % of Base
Gross output	G	100.0	100.0	162.0
Net output	N	67.2	69.5	167.4
Profit on balance	P	14.2	17.8	201.9
Average annual cost of equipment used in first, second and third shifts (total)	C_e	31.5	45.4	233.7
Cost of installed equipment	C_{ie}	22.5	32.2	132.3
Average annual cost of fixed production capital	C_{fpc}	49.6	69.6	227.5
Coefficient of material intensity	C_m	1.49	1.44	97.0
Coefficient of outlays for ing of production apparatus	ov	4.73	3.90	82.4

Table 2. [Cont.]

Indicator	Symbol	Period: Base (1970)	Period: Report (1980)	Report as % of Base
Return on active part of FPC	r	0.45	0.39	86.5
Coefficient of equipment shift load*	Sh	1.40	1.41	100.7
Equipment cost as share of total cost of FPC	a	.45	.46	102.2
Aggregate COR	COR	2.02	1.44	71.2

*Calculation includes equipment cost

On the basis of the data in Table 2, the influence of factors on the final indicator of the efficiency of FPC development and utilization was determined. The factors are as follows:

1. $\Delta COR_M = COR_0 \left(\frac{C_{m_1}}{C_{m_0}} - 1 \right) = 2.02 \left(\frac{1.44}{1.49} - 1 \right) = -0.06$

2. $\Delta COR_{ov} = COR_M \left(\frac{ov_1}{ov_0} - 1 \right) = [2.02 + (-0.06)] \left(\frac{3.90}{4.73} - 1 \right) = -0.35$

3. $\Delta COR_r = COR_{ov} \left(\frac{r_1}{r_0} - 1 \right) = [1.96 + (-0.35)] \left(\frac{0.39}{0.45} - 1 \right) = -0.21$

4. $\Delta COR_{Sh} = COR_r \left(\frac{Sh_1}{Sh_0} - 1 \right) = [1.61 + (-0.21)] \left(\frac{1.41}{1.40} - 1 \right) = 0.01$

5. $\Delta COR_a = COR_{Sh} \left(\frac{a_1}{a_0} - 1 \right) = (1.40 + 0.01) \left(\frac{0.46}{0.45} - 1 \right) = 0.03$

(The index "0" = base period; "1" = report period)

All the calculations are given in Table 3. Their number increases considerably if the capital output ratios are analyzed on a sector scale, since each factor is represented as the summ of all components, equal to the number of subsectors in the machine building and metal working sectors.

The magnitudes thus found determine changes in the aggregate COR indicator as influenced by all changes in the sectors. These, in their turn can be divided into intrasectorial and structural changes in COR. The intrasectorial changes are calculated while holding the fixed production capital structure constant during the period analyzed; and the structural changes as the difference between the general sectorial and intrasectorial capital-output ratios.

Table 3. Changes in Capital-Output Ratio as Influenced by Changes in Factors

Indicator	Increase (+) or decrease (-) of COR		Share of the change in COR influenced by change in each factor of total change in COR, %
Coeffic	Rubles	Percent	
Coefficient of material intensity	-0.06	-3.0	-10.4
Coefficient of outlays for the functioning of production apparatus	-0.35	-17.3	-60.3
Return on active part of FPC	-0.21	-10.4	-36.2
Coefficient of equipment shift load	+0.01	+ 0.5	+ 1.7
Equipment cost as share of total cost of FPC	+0.03	+ 1.5	+ 5.2
Total change in COR	-0.58	-28.7	- 100.0

Changes in the COR influenced by changes in the i-th factor are determined in three stages:

1. As a result of changes in the volume of output produced by the sector

$$COR_{G_i} = \frac{G_{1t} - G_{0t}}{C_{1\,[*]}};$$

2. As a result of changes in the average annual cost of the sector's FPC

$$COR_{ci} = G_0 \left(\frac{1}{C_1} - \frac{1}{C_1 - C_{1i} + C_{0i}} \right)$$

The formula holds for i = 1. If i = 2, instead of C_1, the magnitude $(C_1 - C_{11} + C_{01})$ etc, should be substituted.

3. Under the influence of all changes in the i-th sector

$$\Delta COR_i = \frac{\Delta COR_{G_i} + \Delta COR_{C_i}}{\Delta COR} \cdot 100\%$$

[* Capital in i-th sector]

The sector influences not only the level of the COR, but also its various indicator-factors (C_m,ov, r,Sh, and a). This can be judged from the data in Table 4.

Table 4. Changes in Capital Output Ratios in the Machine Building and Metal Working Sectors in Chelyabinsk Oblast

Sector	Indicator Changes from 1970 to 1980							
	C_m	ov	r	Sh	a	COR	COR_{ov}	COR_r
Machine building and metal working in general	-100.0	-100.0	-100.0	+100.0	+100.0	-100.0	-74.79	-25.21
Power Engineering machines	1.83	0.39	5.80	17.32	0.20	0.68	1.48	-0.80
Mining and ore processing	0.34	1.09	11.18	108.83	58.48	0.01	0.51	-0.50
Lift and Transportation machines	2.77	- 0.16	0.64	31.41	10.92	0.45	1.35	-0.90
Electrical engineering industry	7.73	2.43	11.67	225.87	99.85	3.28	5.97	-2.69
Machine tool and instrument industry	18.20	26.24	- 1.38	75.15	27.32	7.99	16.12	-8.13
Instrument building	2.23	7.20	17.12	79.01	43.23	3.87	2.52	1.35
Motor vehicle industry	4.76	-43.85	53.99	1035.14	312.81	-0.05	-5.85	5.80
Tractor and agric. machinery	-112.31	-23.97	-126.29	257.87	89.69	-60.63	-52.37	-8.26
Construction and road machinery	18.48	-9.04	-7.27	-153.43	-64.69	-0.37	0.93	-1.30
Machine and equip. repair	-27.51	-22.97	-13.33	-760.55	-63.54	-15.92	-22.77	6.85
Other sectors	-16.52	-37.36	-52.13	-816.62	-414.30	-39.31	-22.68	-16.63

In 1981 targeted comprehensive programs for the management of fixed production capital use were developed at large scale enterprises in the machine building and metal working sectors. These encompassed the formation, productive use, and restoration of FPC. Taken together, these programs have shown that the growth rates of production volume have remained unchanged in the 11th Five-Year Plan when compared to the preceding plan. This is due to the total effect of factors such as economic geographic location, natural and labor resources. The effect of the first two factors causes the processing industries to predominate in the Urals. Concurrently, the labor shortage hinders the development of a number of its labor intensive sectors.

The labor shortage is most felt in large cities in Chelyabinsk Oblast, where fixed production capital requiring complete utilization is primarily located. In addition, the shortage of labor influences production intensification, which in its turn has an effect upon labor productivity growth. It should be noted that there are some labor reserves in small towns and urban type settlements in Chelyabinsk Oblast. However, it is not simply workers, but qualified workers who are needed. Therefore the use of such reserves is not always economically justified. This means that in the future one can expect a further reduction in the return on the active part of fixed production capital (machines and equipment).

Some specialists in the utilization of industrial production fixed capital think that it is not possible to justify the reduction in capital output ratios through acceleration of the rates of scientific and technical progress. For example, Ye. M. Prigozhin writes: "The unsoundness of the assertion as to the law governed pattern in the long term decline in capital output ratios is shown by the fact that such a concept justifies their further reduction, since scientific and technical progress will continue at rapid rates."[4]

However, it should be pointed out that in this case the discussion involves the factor "r", one of five factors characterizing capital-output ratio dynamics. The coefficient of equipment shift load is another very important indicator.

Capital-output ratio dynamics are linked to scientific and technical progress rates only when there is no change in the levels of extensive utilization of fixed production capital, which has been characteristic for the majority of industrial sectors over the past 40-50 years.[5] The necessity of significant increases in machine tool and equipment shift loads will promote growth in total indicators of fixed production capital efficiency.

At the present time there is a substantial and ever growing "contrast" in the levels of technology utilized, leading to contrasts in the levels of use. Under these conditions it is important, with the help of better labor and production organization, to properly use expensive, highly productive equipment. Chelyabinsk Oblast machine building and metal working sector enterprises have acquired definite experience in this regard. The corresponding data were used in a factor analysis of capital output ratios provided in this article.

During the 11th Five-Year Plan at these enterprises it is proposed to increase the amount of manufacturing process equipment, increase the shift load coefficient, expand joint and multi-machine tool servicing, and the comprehensive mechanization and automation of machine building operations, as well as improve the structure of industrial production personnel staffs, primarily through a relative and absolute reduction in the number of workers not using machines and equipment in their activities.

Some enterprises are directing attention to reserves for increasing capital-output ratios such as the replacement of expensive equipment by less costly machine tools and other machinery. Apparently, new models of equipment should be made for the production conditions of previously produced models which have proven themselves well. This will permit the customer to select equipment most suitable with respect to technical and economic considerations. However, reductions in capital-output ratios are unavoidable in situations where the customer is deprived of a choice and is compelled to select machines to complex and costly for the given operation.

Another factor is important. The basic reserves for increasing the efficiency of fixed production capital now involve the expansion of a new form of production cooperation the sale or the acquisition by enterprises of machine time on expensive, highly productive equipment. It is essential to precisely organize a centralized information system on underloaded capacity. Machine building and metal working enterprise cooperation in equipment utilization is still of a random nature and has not found the necessary reflection in targeted comprehensive programs. By simply revealing their potentials in this area, machine builders could achieve high metal working equipment shift load indicators.

The development of contemporary production on the basis of intensive growth factors makes new, quite serious demands upon the economic mechanism, and, in particular upon the mechanism for the management of the efficient use of fixed production capital. The improvement of capital-output ratio indicator analysis and the discovery of its role in evaluating the efficiency of social production could be included among the pressing problems in this regard.

FOOTNOTES

1. These and other data are on 48 machine building enterprises in Chelyabinsk Oblast.

2. The question as to these limits is quite complex because it is linked to another question: How does one determine the aggregate indicator of production efficiency? However, in principle a reduction in the capital output ratio is possible as long as production efficiency increases (or at least not declining).

3. A survey of the literature is evidence of knowledge about several dozen of the most diverse combinations of capital-output ratios and various factors determining their overall changes during the period analyzed. However, there is still no generally accepted opinion on this question.

4. Prigozhin, Ye. M., "Povysheniye fondootdachi i koeffitsiyenta smennosti raboty oborudovaniya" [Increasing the Capital-Output Ratio and the Coefficient of Equipment Shift Load], Moscow, Mashinostroyeniye, 1979, p 7.

5. V. Krasovskiy justifiably writes: "Although the utilization level of existing capacity and capital is insufficient with respect to indicators of shifts worked and intrashift loads of equipment, and to many technical and economic indicators, there have been no substantial unfavorable changes in their dynamics, and they therefore cannot explain the undesirable movements of capital-output ratios." Krasovskiy, V., "Economic Problems of Capital-Output Ratios", VOPROSY EKONOMIKI, 1980, No 1, p 108.

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MACHINE TOOL TRADE AMONG CEMA MEMBER COUNTRIES REVIEWED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 10, Oct 82 pp 24-28

[Article by Vyacheslav Moiseyenko, department head, CEMA Secretariat, and Yevgeniy Yegoshin, CEMA Secretariat: "Trade of CEMA Member Countries in Machines and Equipment"]

[Text] Mutual trade in machines and equipment plays a special role in the development of socialist economic integration. It is directly linked to the division of labor in material production, and to its most progressive form -- specialization and cooperation.

The place of this group of goods in the exports and imports of nations in the socialist community is growing with every five-year plan. In the Comprehensive Program it is noted that, placing great importance upon the deliveries of machines and equipment, the CEMA member nations consider it the most active and dynamic sector in mutual trade.

The rapid growth in the trade turnover, and first of all in machine building output, has been possible thanks to the great successes in the development of the national economies attained under the leadership of the communist and workers parties. It was a necessary condition for the reconstruction and further uplift of the CEMA nations' economies in the initial postwar years, and their rebuilding and re-equipment with the newest progressive technology in the subsequent period.

In 30 years (1951-1980) industrial production in the CEMA nations increased 12.5 fold (the analogous indicator for the developed capitalist nations was 3.9 fold). Machine building production in the former increased 35 fold, ensuring the accelerated growth of machine and equipment deliveries.

During 1975-1980 the export volume of this commodity group in mutual trade reached 102.5 billion rubles, compared to 57.8 billion rubles in the preceding five-year plan, and 28.4 billion during 1966-1970. One should especially note that trade in machines and equipment between CEMA nations increased at more rapid rates than their mutual trade turnover. This is seen in Table 1.

Table 1. (1950=1)

	1960	1970	1980
Mutual Trade Turnover	3.2	7.8	25.4
Exports of Machines and Equipment	4.9	14.5	50.8

Thus, during the years of CEMA's existence mutual deliveries of machines and equipment increased more than 50 fold, while the trade turnover in general grew by a factor of 25. This is a result of the expanding and deepening of the international socialist division of labor.

The long term trade agreement for 1981-1985 makes provisions for further increases in the exports and imports of machine building output. It remains, as previously, the most dynamic sector in mutual trade. By 1985 its share in exports will increase to 46 percent

The accelerated development of machine and equipment deliveries is also indicated by the fact that their growth rates surpass similar indicators for the output of the machine building and metal working industries both for CEMA member nations in general, and separately. See Table 2.

Table 2.
(1980 as percentage of 1970)

Item	All CEMA	Bulgaria	Hungary	DDR	Poland	Romania	USSR	Czech.
Growth of machine building and metal working industry	151	207	72	93	175	317	154	107
Exports of machines and equipment in mutual trade of CEMA nations	252	446	292	194	266	378	250	208
Percentage of machines and equipment in mutual trade exports of CEMA nations								
1970	39.7	33.7	45.2	59.8	52.3	28.3	21.8	59.8
1980	41.1	54.3	47.1	64.0	59.9	40.3	23.5	63.2

One should note that these data do not take price movements into consideration. These have increased more significantly for raw materials. Therefore, in terms of physical volume, the share of machines and equipment appears reduced. Thus, Soviet exports this indicator in current prices dropped from 21.5 percent in 1970 to 15.8 percent in 1980, while the physical volume (in constant prices for 1970) increased from 21.5 percent to 26.3 percent.

Machine and equipment exports grew at especially rapid rates in those nations in which machine building was poorly developed previously. The data for Bulgaria are very revealing in this regard. In 1950 this group of goods was practically absent from its exports, while in 1980 it shipped 2.6 billion rubles worth of such products, 54.3 percent of total deliveries, to CEMA nations alone. During this same period Poland increased machine and equipment exports 85 fold; Romania, 148 fold; and there were also high indicators in other nations (Hungary - 29, DDR - 44, USSR - 32, and Czechoslovakia - 22 fold). This is a reflection of the industrial character of their economies and the process of equalizing development levels.

In general, the present share of machines and equipment in the mutual trade of CEMA nations exceeds analogous indicators in a number of developed capitalist nations (for example, among EEC nations it was 32 percent in 1980).

Substantial changes have also occurred in the structure of machine and equipment trade. This involves the more rapid growth in deliveries of items setting the pace of technical progress. Mutual deliveries of electronic technology, equipment for automated management systems, machine tools with numerical program control, equipment for nuclear power plants, chemical industry enterprises, aviation technology, and others grew at pace setting rates. For example, mutual deliveries of electronic computer equipment over a 10 year period increased almost 14 fold, and those of aviation technology 3.8 fold.

CEMA member nations and organizations are now directing their efforts towards the broad utilization of the advantages in international specialization and cooperation in order to improve the scientific and technical standards of production and the organization of the manufacture of new and scarce equipment providing the basis for the introduction of progressive technology and the comprehensive mechanization and automation of production and management in view of the demands of the scientific and technical revolution.

Based upon this, at the 35th meeting, the CEMA Session recommended the concentration of attention upon problems especially important for economic development, upon intensifying the comprehensive nature of cooperation through interrelated research, technical developments, the production and mutual deliveries of machines and equipment, and upon expanding international specialization based upon unified parts and assemblies. In order to do this the Session meeting and the 97th meeting of the Executive Committee of CEMA determined seven priority areas in the organization of specialized and cooperative production of the most important types of machines, equipment and machine systems of primary significance in improving the efficiency of CEMA nation economies, accelerating scientific and technical progress, improving labor productivity, and reducing unjustified imports from capitalist nations. These include new progressive methods of managing production processes, a unified electronic component base, new special manufacturing process equipment for electronics, systems of machines and equipment, including automatic manipulators, systems of modern machinery for open pit mining and the construction of large pipelines, progressive types of equipment for the rational use of fuel and energy, highly productive precision metal working and casting equipment, machinery for the comprehensive mechanization of agriculture based upon highly productive technology, etc.

The implementation of measures directed towards the development of cooperation in this area will assist further significant increases in deliveries of machine building products.

Every year CEMA nations are also increasing their exports of complete sets of equipment. The volume of erection and installation work is growing. Between 1970 and 1980 deliveries of this equipment increased 4.2 fold. In the past five-year plan alone CEMA nations, assisted by the USSR, built and put into operation 480 industrial and other projects of national economic significance. Soviet deliveries of complete sets of equipment and technical assistance to CEMA nations reached 6.3 billion rubles in the past five-year plan, compared to 2.5 billion during 1971-1975 and 1.2 billion during 1961-1965.

During 1976-1980 the USSR, in its turn received from CEMA nations about 1,000 complete sets of equipment for the metallurgical, petrochemical, light, food, and other industries, and for transportation and communications. It purchases more than half of the machines and equipment exported in mutual trade by other CEMA nations.

During the years of its existence, and especially after the ratification of the Comprehensive Program, CEMA has considerably strengthened and intensified the planned foundations of cooperation. It has put into practice such new forms of interaction as the Coordinated Plan of multilateral integration measures, long term targeted programs of cooperation, bilateral long term programs of production specialization and cooperation, and others.

The goal of the long term targeted program in machine building is to supply economies' leading sectors with modern highly productive equipment. These sectors include the extractive industries, agriculture and food processing, as well as machine building itself, for its qualitative restructuring.

It is an important feature of the contemporary stage of cooperation that the deliveries of the specially produced equipment are growing at more rapid rates than those of machine and equipment trade in general. The following data are evidence of this: during 1971-1980 the export of specialized items within the framework of CEMA reached 8.8 billion rubles, and increased 6.5 fold, with a 3.5 fold growth of deliveries of this commodity group. In 1980 the share of specialized products from machine building amounted to 35 percent of the sector's total exports, compared to 17.7 percent in 1971. The growth dynamics of various types of machinery and equipment are shown in Table 3.

A sizable share of exports is accounted for by specialized production of electric and motor vehicles, equipment for the textile, hide, footwear, and fur industries, electronic and radio measuring instruments, and others.

Similar tendencies are also observed in the current five-year plan, with deliveries of specialized products continuing to grow at more rapid rates. In accordance with long term trade agreements during 1981-1985 these deliveries will increase 45 percent.

The development of specialization and cooperation makes it possible for nations to organize the mass production of items in the optimal numbers, and to plan their production and supply over a prolonged period. In Bulgaria, for example,

in 1980 out of a total of 65,500 electric and motor vehicles manufactured, it delivered 58,700, or 89 percent to its CEMA partners. In the same year CEMA nations purchased 77 percent of the buses produced in Hungary.

Table 3. (In percent)

Product	1975	1980
Metal cutting machine tools	25.0	46.4
Forge and press equipment	11.2	43.2
Electrical engineering equipment	10.6	35.6
Lift and transportation equipment	46.2	61.1
Equipment for textile industry	25.2	53.1
Equipment for chemical industry	25.5	34.0
Road and road construction equipment	40.5	49.8
Communications equipment	15.3	24.9
Bearings	20.6	87.3
Tractors	39.8	44.5
Agricultural machinery	31.9	44.6
Trucks and garage equipment	3.4	43.2
Ships and ship and port equipment	81.6	81.3

The following facts show what the fraternal nations receive from participation in the international socialist division of labor. On the basis of international specialization, during 1960-1980 Bulgaria increased the production of electric hoists 29 fold, and that of electric and motor vehicles 21 fold. Its enterprises reached larger production series than the largest Western European firms. During this same period bus production in Hungary grew 6.6 fold. Thanks to international specialization, the Ikarus Plant became one of Europe's largest. Hungary exported more than 60,000 buses to the USSR alone. On the same basis the DDR increased the production of chemical equipment almost 10 fold and that of agricultural machinery - 7 fold; Romania increased metal cutting machine tool production 6.6 fold, and Czechoslovakia increased the production of manufacturing process equipment for the textile industry 16 fold.

In the past decade CEMA nations have begun to give greater attention to specialization in assemblies and parts and in the production cooperation which it entails. Thus, the Raba Plant in Hungary is engaged in the large series manufacture of rear-axle assemblies for buses and heavy duty trucks. During 1976-1980 the USSR alone purchased more than 150,000 such assemblies for installation in motor and trolley buses. They are also delivered to other CEMA nations. In its turn Hungary uses Soviet made front end assemblies for its buses.

Within the framework of international specialization the AvtoVAZ Association (USSR) obtains from Hungary 300,000 - 400,000 sets of parts, including

instruments, and precision electrical and mechanical equipment. Enterprises in Bulgaria, Poland, Czechoslovakia, and Yugoslavia also participate in cooperative deliveries. These are only isolated examples of mutually advantageous cooperation among socialist states. Every year there are more such examples.

It would be especially fitting to note that the most important multilateral agreements (contracts) covering specialization and cooperation, which have been signed in recent years, make provisions for the organization of series production and mutual deliveries not only of completed machines, but also accessory units. Examples of this are the agreements (contracts) in machine tool building, tractors and agricultural machinery, and other areas. The contract on multilateral specialization and cooperation in the production of metal cutting machine tools (including those with numerical control), special, heavy, and unique machine tools and automatic lines provides for the mutual delivery of more than one million assemblies and accessories for metal cutting machine tools.

The same principle is the basis for the general agreement on industrial robots signed at the 36th meeting of the CEMA Session. It intends the more complete satisfaction of various sectors' requirements both for the final products (automated manipulators with program control) and for standardized modules, assemblies, and parts.

The expansion and intensification of production specialization has brought about the present day situation where CEMA members cover the greater part of their import needs for machinery and equipment through mutual deliveries. In 1980 the share of such deliveries reached 68 percent of the total imports of this commodity group. The situation for the various items is as follows:

Table 4.

Product	Units	CEMA mutual deliveries 1980	Percentage of total imports
Metal cutting machine tools	1000s	28.4	64
Power and electrical engineering equipment	mil. rubles	1771	66
Lift and transportation equipment	"	1205	82
Chemical and paper industry equipment	"	5855	65
Instruments, laboratory and medical equipment	"	1128	60
Tractors and self-propelled units	1000s	39.8	96
Railroad freight cars	"	6.8	93
Trucks	"	65.7	97
Automobiles	"	319.0	95
Buses	"	16.5	97
Ships and ship equipment	mil. rubles	922	63

During the period of CEMA's activity, the fraternal nations have created and are constantly improving a system for the organization and regulation of mutual trade, including that of machines and equipment. This system involves the legal regulation of exports and imports on the basis of long term trade agreements and annual protocols, common principles of price formation and delivery conditions, a coordinated system of trade balances and accounts, etc. Delivery volumes of specific types of specialized products are included in long term trade agreements and annual protocols. This gives them the character of firm international obligations.

The CEMA Standing Commission on Foreign Trade, taking into consideration the growing role of specialized production in mutual deliveries, has developed standard statutes and requirements for agreements on production specialization and cooperation. They are widely used by CEMA nations in the preparation of agreements and contracts.

The technical servicing system is yet another major problem arising from the rapidly increasing volumes of machine and equipment deliveries and the ever growing complexity of machine parts. In view of this, CEMA nations and organizations, in particular the Standing Commission on Foreign Trade, are working on its further improvement. This involves the development and implementation of measures for expanding the importing nations' networks of service facilities, including the organization of centers and spare parts warehouses, specialist training, etc.

The CEMA Executive Committee, having approved at its 102nd meeting the agreed upon suggestions developed by the Commission to improve the General conditions of technical servicing, made changes and supplements to them. Also of great significance are the Commission's General conditions for installation and other technical services involving the delivery of machines and other equipment, and the General principles for the supply of spare parts for equipment traded among CEMA nations and Yugoslavia, approved by the Executive Committee. Work is now under way within the framework of the Commission to improve the previously ratified General principles for supplying spare parts to CEMA nations and Yugoslavia.

The decisions of the CEMA Session's 36th meeting play an important role in the further development of machine and equipment trade. The Session's communique notes that in the course of planned work on the implementation of the Comprehensive Program and the long term targeted programs great attention was given to the development and organization of specialized production of progressive machine and equipment systems having great importance for converting the economies to intensive development paths.

In order to combine efforts in the most areas of scientific and technical progress, general agreements on cooperation in the development and extensive use of microprocessors, and on the organization of industrial robot production on a specialized and cooperative basis were signed at the Session. These agreements make provisions for joint research and development work, the organization of the series production and mutual deliveries of automated sets of manufacturing process machines, instruments, and control systems equipped with the newest electronic devices.

The Session also signed an intergovernmental multilateral agreement on problems of specialization and cooperation in the production of components of the microelectronic base for computer hardware, and of materials and equipment for microelectronics.

Recommendations were accepted in the further development of cooperation in the nuclear energy, and in specialization and cooperation in the production of equipment for nuclear power plants, and for other equipment, as well as for their mutual deliveries.

The necessity of expanding mutual trade, particularly in machines and equipment, is dictated by the fact that imperialistic circles in the US and other NATO nations harshly discriminate against CEMA nations, have started applying "sanctions" and curtailing trade and economic ties.

At the Session it was unanimously noted that such actions by imperialistic circles will not be successful. The nations of the community, strengthening their unity and mutual cooperation, and developing ties with other nations interested in consolidating peace and international cooperation, will continue to make confident movement forward.

The course towards intensification of economic development found its reflection in the Program for the coordination of national economic plans for 1986-1990, approved by the Session's 36th meeting. It places special importance upon the use of the potentials for the international socialist division of labor in order to accelerate scientific and technical progress and extensively introduce the latest achievements of science and technology based upon the deepening production specialization and cooperation in machine building and radioelectronics. This will more completely meet the fraternal nations' requirements for products from these sectors.

The implementation of long term programs of cooperation and bilateral long x range programs for production specialization and cooperation, as well as the Session's decisions and recommendations will strengthen the basis for the technical modernization of CEMA nation economies, for the automation of production processes in industry, agriculture, and many types of work in management. It will thus assist in the further dynamic development of mutual trade in machines and equipment.

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INTRABRANCH PRODUCTION SEEN AS A WAY TO EFFICIENT MACHINEBUILDING

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[Article by G. Dzhavadov, doctor of economic sciences and I. Semikras, administration chief of the Minstankoprom [Ministry of Machine Tool and Tool Building Industry]: "Development of Interindustrial Production -- Factor in Intensification of Machinebuilding"]

[Text] Machinebuilding plays an important role in the reequipment of the national economy, being its material-technical base. The creation of the necessary conditions for the fullest and most efficient utilization of all production resources depends on the level of development of this industrial sector.

Machinebuilding in our country is developing at relatively high rates. The average annual rates of the growth of its gross output were: 1966 to 1970 -- 12.1%; 1971 to 1975 -- 12%; 1976 to 1980 -- 8.6%.

About 3700 types of machines, equipment and devices are created annually; over 1800 automatic lines are placed in operation. The output of machine tools with programed control has doubled (10,000 units in 1981), automatic forge-press machines have increased by 1.8 times.

Much has been done to increase the production of agricultural equipment. The output of over 200 new agricultural machines has begun. The manufacture of machines and tool sets for powerful tractors increased by 1.9 times. Capacities for the output of trucks has increased. The Kama complex for the production of heavy-freight trucks was put in operation. Nuclear machinebuilding is developing at a rapid rate. Metallurgy received new equipment for continuous casting of intermediate products, 400-ton steel smelting converters and automated rolling mills.

However, in recent years, machinebuilding has not been keeping pace with the requirements of the national economy because the growth rate of labor tools is considerably lower than the rate of growth of the gross output. They were: 1966 to 1970 -- 7.6%; 1971 to 1975 -- 8.5% and 1976 to 1981 -- less than 7%. The present rate of growth of the output of qualitatively new equipment delays the replacement of outdated and worn-out machines and equipment, reequipment and comprehensive mechanization of production. The technical standards and qualities of certain types of machines and devices still do not meet modern requirements; renovation of the products of a number of machinebuilding enterprises has slowed down which

induced a trend of an accelerated growth of the capital-labor ratio as compared to the productivity of labor. Moreover, in spite of the increase in the active part in the total cost of fixed industrial capital, the efficiency of its utilization is frequently reduced.

Reequipment of the national economy and completion of its changeover in the eighties to a path of intensive development poses the problem of considerable improvement in the quality of machinebuilding products and increases the responsibility of developers of new equipment. A situation exists where machinebuilding does not meet the demands of a number of national economic sectors not only of individual, special design types of equipment, but also several types of the usual series produced equipment.

In machinebuilding there is a relatively low ratio of specialized production of technological fixtures, tools, nonstandard equipment and general machinebuilding application products (mechanical, hydraulic and pneumatic drives, intermediate products etc.). As before, the majority of types of equipment produced is not provided with sets of replaceable repair units and parts; specialized production of units to modernize equipment is not being developed. As a result, sectors that use the products of machinebuilding are forced to organize the output of units and spare parts for repairs and modernization by primitive production methods and are of low quality.

Further improvement in the design and pool of metalworking equipment assumes an increase in the share of forge-press machines, grinding machine tools, modern special and unit head machine tools, machine tools with ChPU [Numerical Programed Control] and, especially, multistation machining centers. A substantial part of the equipment produced is too heavy which is determined by the low ratio of modern profiles used in the machine design, the limited assortment of available rolling stock and the high ratio of the cutting technology. As a result, over 40% of the workers and 50% of the engineers, technicians and empolyees are occupied in domestic machinebuilding. During the last three five-year plan periods over half the entire increase in industrial workers were drawn into machinebuilding. This situation with the utilization of the work force is not economically substantiated.

The acceleration of the renovation of the output as a consequence of the increasing requirements in new labor tools (machines, equipment, devices) -- is an objective and regular process of developing socialist production under conditions of scientific technological revolution. One of the most important conditions for the efficient use of new equipment and technology is high design-technological homogeneity of labor products (raw materials, finished products etc.). At the same time, the increase in the number of kinds of machines, equipment and devices leads unavoidably to a reduction in the level of technological unity and the use of series production; reduces equipment loading; increases the time spent on readjustment, disrupts the regularity and continuity of the production process; and makes it impossible to use the qualitatively new equipment and modern technology efficiently.

The expansion of the list of products is due not only to the development of production and the increase in social requirements. This process is also the result of the dispersal and unsubstantiated heterogeneity of producing products for one and the same functional purpose.

In our opinion, one of the most important premises for improving the organization of production is the rationalization of the machinebuilding product list and of all its components, and the introduction of modern organizational forms (centralization, concentration, specialization and cooperation). A decisive means for regularizing the production list is the wide use of standardization principles in design and production.

Standardization that provides design-technological uniformity of the output and all its components (units, parts and even elements of parts -- holes, threads, seats for bearings and gaskets etc.) will make it possible not only to eliminate duplication; reduce the diversity of the product assortment; it will also reduce sharply the number and kind of tools used, the cost and time for technological preparation for production, and will increase significantly the amount of series production, technical standards and quality of the product.

Domestic and foreign practice confirms the efficiency of using standardization principles, especiallyin designing and producing products of high technical standards and quality. Aggregating automatic equipment shortens the period for reequipment by 6 to 8 times, the product list -- by 8 to 10 times, and production costs -- by 2 to 3 times. Standardization is especially efficient at the interbranch level. Investigations by economists indicate that in the production of many types of machines and equipment on the average for the number of types, 50% of the standard parts, 43% of the general purpose parts and only 7% of the specialized (original) parts may be used.

Developments directed toward searching for design-technological unity of various types of machinebuilding output and its components on the basis of using standardization principles with the further concentration and specialization of their output -- is the most important premise in changing the organizational forms of production.

Of great importance for the intensification of machinebuilding production is the organization of a highly specialized industry for the production of products for general machinebuilding use (OMP). It has now become necessary to develop and implement a complex of measures on improving the structure and organization of machinebuilding according to the modern stage of the scientific-technological revolution and the growing demands of the economy of the country. The efficient realization of the indicated measures must rest on the investigation of the level of OMP production and its special features.

The basic directions for economic and social development of the USSR in 1981-1985 and the period of up to 1990, adopted by the 26th party congress, specify measures for the further specialization of machinebuilding production -- the creation of new specialized enterprises and the expansion of existing ones, and large shops for manufacturing imtermediate products, parts and hardware for industrial and interbranch use.

The accelerated development and concentration of specialized production of products for use in general machinebuilding construction is of decisive importance for machinebuilding itself. These products include widely used units and parts which can be used directly without finishing off and additional equipment, manufactured by various machinebuilding branches; these also include intermediate products that are of a common design-technological nature.

Of high priority in the list of OMP products are such highly scarce products as: hydraulic drives and hydraulic automatic machines; lubricating equipment and filtering devices; standard reducers and motor reducers; drive, traction and load laminated chains; natural and enriched molding sands and auxiliary molding sands; cast iron and steel castings; hot stampings and cast forgings; welded machinebuilding metal structures; and metal powder articles. However, to provide for the series production of such products all of high quality as well as for raising machinebuilding efficiency as a whole, it is necessary to take urgent measures on concentrating and specializing production. The list of OMP products has a tendency to expand continuously and depends directly on the level of standardization in machinebuilding.

In the 8th - 10th Five-Year Plan periods, a great deal of work was done in the area of planning and organizing the development of specialized and centralized OMP product production. In 1965, formation of a new branch of machinebuilding began -- an industry of interbranch productions within the framework of the USSR Minstankoprom whose output and economic ties were of a general machinebuilding nature. Four all-union industrial associations (VPO) were formed in the Minstankoprom according to the output of general machinebuilding use: Soyuzgidravlika, Soyuzmashnormal', Soyuzlitprom and Soyuzformomaterialy. An administration for coordinating the production for general machinebuilding use was created in the structure of one central apparatus of the ministry. This administration plans the development of production, capital construction and new equipment for the above-indicated types of products.

In the goals of national economic plans for OMP products volume of production, an increase in the capacities of specialized production, as well as volumes of capital investments for these purposes are specified by an individual line -- for all ministries and departments of the USSR and councils of ministries of union republics. In the Minstankoprom for the interbranch productions industry, planning is set by an individual line for all plan indicators. Machinebuilding ministries are responsible for the development of centralized production, the technical standards and quality of certain types of general machinebuilding application products. Besides, the Minstankoprom is also responsible for carrying out in the country a single technical policy in the area of centralized production of such products.

The indicated measures facilitated the development and concentration of production of OMP products and an improvement in meeting the requirements of such products of machinebuilding and other branches. In the Minstankoprom industry of interbranch productions, as a result of the reequipment and modernization of existing specialized enterprises, as well as the creation and assimilation of new capacities during the 8th, 9th and 10th Five-Year Plan periods high rates of development were provided (for commercial output, correspondingly -- 200, 197 and 164%). Fixed production capital during that period increased by 10 times while the number of workers -- by about 3 times. The share of interbranch productions of the Minstankoprom in the general commercial output of OMP products increased; for hydraulic-pneumatic equipment and filtering devices it was about 40% and for reducers -- 80%.

Positive trends were also noted in the development of the production of specialized OMP products in machinebuilding as a whole. The commercial output of hydropneumatic drives and apparatus increased from 1965 to 1980 inclusive by almost 5 times. The centralized production as a whole increased by 5.6 times and of intrabranch

Minstankopromproductions -- by 10 times. Centralized production of intermediate products expanded by 6.5 times and 11 to 13% of their production in machinebuilding in 1980 as against 2.5% in 1965.

Gradually the potential of the new branch is being created whose formation will improve further the organization, and increase the economic efficiency of the entire machinebuilding production. At present, 120 specialized enterprises for the centralized production of OMP products are in operation or in the construction (modernization) stage. These include 37 enterprises for intermediate products; 31 -- for hydropneumatic lubrication equipment; and 10 -- for reducers and motor reducers.

At the same time, there are up to this time a great number of small shops and sections in the country especially for producing intermediate products, with small outputs, high labor and material expenditures and of low quality. According to the USSR TsSU[Central Statistical Administration],of each 100 machinebuilding enterprises the following produce for their own needs: cast iron -- 71; steel castings -- 27; forgings -- 84; stampings -- 76; and metal fastenings -- 65. Over 3000 shops, many of which have an output of less than 500 tons annually produce castings.

Enterprises that have an output greater than 1,000 castings per year make up 20% of the total number of enterprises of that kind and produce about 80% of the total volume of castings. The share of small enterprises (with an output of 500 to 1000 tons of castings per year) is also equal to 20% per year, but they produce only 1.5% of the entire output. The production cost of a ton of castings at the enterprises of the first group is about half, while the output per worker is 3 times greater than in enterprises of the second group.

So far, the level of OMP product production does not meet all the requirements in even one of these types. The requirements in a number of cases rise much faster than the production which increases the gap between them. In 1980 centralized production satisfied only the following requirements: hydraulic drives and hydraulic automatic machines -- 40 to 45%; lubricating equipment and filtering devices -- 15 to 23%; standard reducers -- 55%; cast iron, steel, nonferrous casting -- 11 to 13%; hot stampings -- 11%; enriched molding sand -- 11%.

The situation is not always explained by the optimal distribution of capital investments directed toward the development of specialized production, including centralized production of the indicated products. During 15 years (1966-1980) capital investments allotted for these purposes in the annual plans were reduced by 15.5% as against those specified by the five-year plan (mainly for the production of intermediate products). At the same time, for machinebuilding as a whole, capital investments in annual plans correspond practically to the level of the five-year plans while there was even some increase for the basic output. The ratio of capital investments in the development of production of OMP products in their general volume for machinebuilding as a whole was reduced by up to 10% in the 10th Five-Year Plan period as against 14% in the 8th Five-Year Plan period.

The formation of a sector for interbranch production because of the deficiency of the present material-equipment base assumes the construction of new modern specialized enterprises. However, this is not always taken into account in the

preparation and approval of the list of new construction projects. The most important individual interbranch projects are frequently omitted from this list which delays the development of centralized production of the indicated products and increases the tension in the machinebuilding industry. To this must be added the systematic unfulfillment of the construction plans of ministries on putting in operation capacities of specialized enterprises. The fulfillment of construction plans for enterprises intended to produce OMP products is much lower than for machinebuilding as a whole (75to 78% as against 94 to 95%).

Along with the growth of machinebuilding output requirements in OMP products, such intermediate products of various kinds, mechanical and pneumohydraulic drives etc. also change. The development of the production of intermediate product castings is related to their greater requirements in basic and auxiliary molding materials. The sharp increase in the number of hydropneumatic machines and equipment, the mechanization and automation of production processes in all sectors of the national economy bring about an increase in the requirements in hydropneumatic equipment, reducers, variable speed drives etc. Their scarcity delays the growth of machinebuilding, retards the improvement of technical standards of machines and equipment, reflects negatively on the rates of automation and mechanization in industry, construction and transport.

One of the decisive factors in the growth of machines and equipment, their technical standards and quality is their acceleration of equipment with hydraulic drives and pneumatic automatic machines. Specialized plants built in 1966-1975 for the centralized production of the indicated products were influential in increasing greater use of hydropneumatic equipment in machine tools, forge-press machines, agricultural equipment, road building machines etc. The output of metal-cutting machine tools in 10 years (1971-1980) increased in monetary terms by 1.87 times; the volume of supplies of hydraulic equipment and hydraulic automatic machines for them increased by 5 times; for forge-press equipment these figures were 2.66 and 7 respectively; for casting machines -- 2.65 and 4.5; for woodworking equipment -- 1.33 and 4 times. This increased the productivity of the indicated groups of equipment by 10 to 15%.

In many cases the use of modern types of hydraulic drives, especially with proportional controls, make it possible to raise the productivity of labor considerably. Automatic machine tools with hydraulic drives have capacities 20 to 30% greater than machine tools with mechanical drives while drilling rigs for petroleum and gas wells with hydraulic drives increase labor productivity for this laborious work by 30 to 50%. The use of hydraulic transmissions in tractors increases the productivity of plowing by 25 to 30% and in transport work -- by 40%. The power of grain harvesting combines with hydraulic transmissions increases the harvest of fallen grain crops by 40% and in harvesting rice -- by 50%. Along with this, the control of tractors and combines is simplified greatly and breakdowns due to overloads are reduced.

The requirements in hydropneumatic drives and automatic machines at present are considerably ahead of the growth of their production. Especially scarce is hydropneumatic equipment produced by the specialized plants of the Minstankoprom and used by all sectors of machinebuilding. Thus, only 65% of the requirements for hydropneumatic lubrication equipment and filtering devices is satisfied.

A great amount of work must be done to develop the intermediate product base of machinebuilding. In recent years, a delay began in the development of machinebuilding and, therefore, urgent steps should be taken in the development of this base. For example, a lack of castings with spill channels does not permit an increase in the production of hydraulic equipment and automatic machines, while the deficiency of capacities for manufacturing reducer equipment does not permit an increase in the production of reducers.

The expansion of the output of molding materials, a full and continuous supply of their requiremnts will be of great importance in insuring the regularity of casting production and increasing the quality of intermediate products. For many years, the present practice has been based on extracting and using molding sands. Technical progress, however, demands not only high quality molding sands, but also a considerable expansion of the assortment and a higher quality of the materials used (color, nonsticking compounds, clays, etc.)

All this calls for a radical change in the very nature of production, the creation of specialized mining-enriching combines equipped with highly mechanized and automated modern equipment and technological processes, as well as the assimilation of new deposits. Many existing pits are being depleted and their operation will be completed in the very near future. This situation, at present, applies to the Lyuberetskiy and Lukhovitskiy pits that take care of machinebuilding in the Central Economic region and its adjacent regions.

To replace depleted capacities and further develop molding materials production, the 9th and 10th Five-Year Plans specified the modernization of many existing pits and the building of new ones and enriching factories. However, by virtue of a number of objective reasons as well as failures in fulfilling plans in the seventies, only slightly over 30% of the volume in the plan for new capacities was placed in operation. Therefore, a tense situation occurred in the production of molding materials.

All this attests to the fact that solving the problem of existing disproportions in the development of production of OMP products and machinebuilding as a whole requires a comprehensive approach at all stages of planning and management of the national economy.

The most important problems in this area are:

acceleration of the creation of new capacities for the production of hydropneumatic lubricating equipment and filtering devices;

realization of tasks on building new plants for centralized production of reducers and motor reducers;

elimination of the lag in the intermediate product base (reequipment on a wide scale of existing production facilities, creation of new specialized enterprises for centralized manufacturing of intermediate products and the development of specialized production of products from metal powders);

development and assimilation of new capacities for extracting and enriching molding materials for casting.

As shown by the practice in previous years, the development and realization of measures for solving partial problems in the area of developing specialized production of individual types of OMP products does not produce the proper effect. Many problems in developing production, raising technical standards and the quality of OMP products may be solved only with the participation of all interested ministries including the non-machinebuilding ones (for example, developing and supplying materials and complementing products, bearings, industrial rubber products, oils, lubricating and detergent liquids and preparation etc.). All this will accelerate the implementation of measures to improve the planning and management in developing interbranch production.

2291
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METAL REQUIREMENTS FOR MACHINEBUILDING DISCUSSED

Yerevan PROMYSHLENNOST' ARMENII in Russian No 10, Oct 82 pp 67-69

[Article by economist A. I. Akopyan: "Reserves of the Economy of Material Resources"; passages rendered in all capital letters printed in boldface in source]

[Text] The fulfillment of the extensive program of economic and social development, which was outlined by the 26th CPSU Congress, is responsible for the steady increase of the need for raw materials, fuel, energy and other material resources.

Under the conditions of the intensification of scientific and technical progress and the increase in this connection of the scale of production the problem of increasing the efficiency of the use of metals in machine building and metalworking, in which about 55 percent of all the finished metal products are consumed, is acquiring an especially important role.

In spite of the gains made in the area of the obtaining of new polymeric and nonmetallic materials, metals in the immediate future, as in the past, will serve as the main construction material. It should also be taken into account that metal is becoming more and more expensive. The proportion of the iron ore, which requires additional expenditures on concentration, has increased as compared with 1950 by more than twofold. Meanwhile, the metal scrap in machine building of the country for the present is very great. A considerable amount of metal ends up as chips, one-fifth of which during remelting are lost in the form of furnace losses. In our republic in 1980 the proportion of scrap and waste in metalworking was equal to 63 percent of the total consumption of metals, while of the total amount of scrap metal chips made up 33.8 percent.

During the 1980's a decrease of the growth of the metal content is planned by the more extensive use of resource-saving equipment and technology and the introduction of advanced types of materials. Thus, during the current five-year plan it is proposed to increase by threefold the production of metallic powders (while the use of 1,000 tons of powders makes it possible to save 1,500-2,000 tons of rolled metal products and to increase labor productivity by twofold). The use of polymers not only saves metal, but also promotes the making of fundamentally new design decisions.

For Armenia, which in practice does not have its own base of ferrous metals, the problem of their economy is very urgent. Considerable reserves of the decrease of the metal content in machine building of the republic lie in the adoption of

advanced methods of the machining of metals and the increase of the proportion of forge and press equipment as compared with the dominant metal-cutting equipment.

The increase of the utilization ratio of metals in many ways depends on the enlargement of the range and the improvement of the technical characteristics of the metals and on the range and deliveries of advanced shapes. However, the production of economical types of rolled products by the metallurgical industry of the country is limited, while in the total deliveries of rolled metal products in the republic economical rolled sheet makes up less than 30 percent.

During the 11th Five-Year Plan it is envisaged in machine building and metalworking to decrease the rates of consumption of rolled ferrous metal products by not less than 18-20 percent and steel pipe by 10-12 percent. Such measures on the improvement of the rate setting of the consumption of materials as, for example, the enlargement of the range of material resources, with respect to which centralized assignments on the average decrease of the rates of consumption are established, serve the achievement of these indicators. Here it should be noted that the very concept of a rate has changed: previously it was not of a directive nature and instances of the establishment by enterprises and associations of overstated rates occurred, now the rates of consumption of the most important types of materials are set in the five-year and annual plans in physical terms per unit of output or work. Material responsibility for the excessive consumption of raw materials and materials has also been introduced: the excessively consumed physical assets are paid for at higher prices and rates. The question of tightening up the monitoring of the observance of the rates of consumption and the storage of physical assets is also arising.

The improvement of the rates of consumption of materials is a mandatory prerequisite of the sound planning of the need for resources. At present the lack of knowledge at the time of the drafting of supply plans about the precise production program and the lack of scientifically sound detailed rates of consumption of materials are complicating the correct determination of the need. Frequently the approved plans are adjusted during the year as a result of the introduction of advanced forms of the organization of production, new equipment and technology and the change of the products list. Moreover, for the assurance of the smoothness of operation the enterprises often overstate the demands for some types of materials, which leads to the formation of above-standard and surplus stocks. In our opinion, when making calculations of the need for materials it would be advisable to combine the methods of direct calculation with statistical methods, that is, methods which are based on the study of the actual consumption of materials in preceding years and on the use of methods of forecasting the demand.

The assurance of the timeliness and completeness of the deliveries of materials is one of the important questions of the saving of material resources, the settlement of which depends on supply organs. Under the conditions, when the fulfillment of economic contracts or the plans of deliveries of products has become the main criterion of the evaluation of the activity of the industrial enterprises and organizations of the supply system, the material responsibility for the timely and high quality fulfillment by suppliers and supply and marketing organizations of the contractual obligations is increasing considerably and the monitoring of it is being tightened up.

The difficulty of ensuring the completeness of deliveries is governed by the fact that given the wide range of consumed materials, the majority of them are required by enterprises in a negligible amount. Thus, the analysis of the data on the breakdown of the grade sizes of rolled ferrous metal products in machine tool building of the republic revealed that the need for them is less than one transit norm a quarter, therefore the enterprises consolidate the orders of several grade sizes. THE MOST IMPORTANT CONDITION OF THE MORE COMPLETE UTILIZATION OF MATERIALS IS THE SUPPLY OF CONSUMERS WITH THEM IN NONTRANSIT AMOUNTS. The solution of this problem requires the further improvement of warehousing services.

The problem of developing warehousing services and improving the conditions of the storage of materials is also assuming especially great importance because the improper storage of materials, particularly metals, leads to great losses (due to corrosion alone the national economy of our country loses a large amount of metal). The losses of metals are also large in the system of the Armenian SSR Gossnab, where only 45 percent are covered warehouse facilities, the rest are open yards and sheds. The level of mechanization of warehouses is low: the proportion of machines and equipment comes to only 15 percent of the value of the fixed capital. It should be noted that at present designs of specialized warehouses of ferrous metals and hardware are being developed, the implementation of which will make it possible to ensure their preservation.

The identification and commitment to the economic turnover of above-standard and surplus stocks of materials at the consumers' and at the warehouses of supply organs are acquiring particular importance. In the republic owing to the work performed in this direction in recent years by the beginning of 1981 as compared with the corresponding period of 1978 the above-standard stocks of raw materials and materials had been reduced at the consuming enterprises by 80 percent, while in the system of the republic Gossnab they had been reduced by nearly 30 percent. Nevertheless they are still great. However, such a form of reducing stocks to the norm as the regulation of deliveries is rarely used. Whereas as a whole for USSR Gossnab the regulation of deliveries accounts for about 30 percent of the total amount of products committed to the turnover from the above-standard stocks, for the Armenian SSR Gossnab it accounts for only 1-6 percent.

The analysis of the structure of the reserves of commodity stocks for the Armenian SSR Gossnab revealed that as a whole they are higher than the standard reserves, but the reserves of some materials, for example, ferrous metals, constantly do not reach the standard level, since rolled sheet products, wire rods and others are systematically delivered in insufficient quantity. This is adversely affecting the fulfillment of the production program by a number of republic machine building enterprises. At the same time the structure of the reserves, which has formed in the republic, is such that at many enterprises the actual surpluses of rolled ferrous metals are greater than the established standards. THE BRINGING OF THE AMOUNTS OF THE ACTUAL SURPLUSES TO THE STANDARD LEVEL WILL MAKE IT POSSIBLE TO IMPROVE THE STRUCTURE OF THE TOTAL RESERVE, HAVING INCREASED IN ITS COMPOSITION THE SHARE OF THE MORE MOBILE RESERVE COMMODITY STOCKS.

It is also necessary to improve the notification of consumers and supply and marketing organs about the surplus physical assets which are available at enterprises. The presently available information on the availability of above-standard and unnecessary materials (form 15-si, which is filled out quarterly, and form 8-sn,

which is filled out once a year) does not make it possible to shift material resources efficiently.

THE DEVELOPMENT OF ADVANCED FORMS OF SUPPLY, FIRST OF ALL DIRECT LONG-TERM ECONOMIC TIES, TO A CONSIDERABLE EXTENT PROMOTES THE ECONOMICAL USE OF MATERIALS. The improvement of the quality and the enlargement of the assortment of the products being supplied, the decrease of the consumers' losses from defective production through the fault of suppliers, the number of necessitated substitutions of materials and so on are a positive consequence of their establishment. The changeover of enterprises to direct long-term economic ties creates important prerequisites for the planned adoption of the policy of economy of material resources, which is specified for a long-term period. However, in spite of the obvious effectiveness, direct long-term times are being introduced extremely slowly in our republic. At present 290 production associations and enterprises, to which about 300 grouped descriptions of products are delivered, are covered by them.

The introduction of a system of complete supply promotes to a great extent the reduction of the above-standard reserves of raw materials and materials, the increase of the smoothness of supply and the increase of the volume of the services rendered to consumers. During the years of the 10th Five-Year Plan in the republic only 15 enterprises of the Ministry of the Machine Tool Building Industry and 2 enterprises of the Ministry of Road Machinery Building were converted to complete supply, the volume of deliveries came to only 1 percent of the wholesale commodity turnover.

Within the framework of complete supply the consumers are provided with rolled ferrous metal products and metal items, nonferrous metals, steel pipe and paper products. THE DEVELOPMENT IN THE REPUBLIC OF SERVICES ON THE PREPARATION OF METAL PRODUCTS FOR CONSUMPTION IN PRODUCTION CAN PLAY A POSITIVE ROLE IN THE ECONOMY OF METALS. FOR THIS PURPOSE IT IS EXPEDIENT TO CREATE IN THE SYSTEM OF THE REPUBLIC GOSSNAB SECTIONS FOR THE COLLECTION, SORTING AND TREATMENT OF SCRAP METAL.

Such a form of services on the part of supply organs as the rental of instruments, which so far has not become widespread in the republic, can also provide a large saving. Meanwhile, this is the most advanced method of providing consumers with equipment in those instances when they use it regularly.

The consistent implementation of the indicated measures will require the further development of the entire system of material and technical supply, the increase of the amount of activity and the enhancement of its role in the efficient use of material resources and in the increase of the efficiency of social production. The creation of an interdepartmental commission for the economy and efficient use of material resources (which is headed by the chairman of USSR Gossnab), the main tasks of which are: the coordination of the work being performed in the country on the improvement of the use of raw materials and materials on the basis of the achievements of science and technology, the tightening up of the policy of economy and the monitoring of the progress of the implementation of measures on the efficient use of material resources, is also of great importance in the settlement of these questions.

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BRIEFS

MACHINE TOOLS WITH ROBOTS--Wide possibilities open up for multimachine tool servicing with the use of the new products of the Vitebsk Machinebuilding Plant imeni S.M. Kirov. The enterprise assimilated series production of grinding machines in a set with a robot manipulator. This week such equipment will be sent to machine builders of Armenia and Kirghizia. At present, one person can operate three such machines simultaneously. The organization of series output of the new equipment was made possible by the modernization of the plant. This is only the first step of the Belorussian machine tool builders in solving the problems of automated production. [Text] [Moscow KRASNAYA ZVEZDA in Russian 28 Nov 82 p 1] 2291

MACHINE TOOL EXPORT-IMPORT--Regular large contracts were signed by the All-Union "Stankoimport" Foreign Trade Association and the Austrian Firm "Khayd." They involve deliveries into our country in 1983-1984 of about 60 machine tools for pipe rolling plants and into Austria from the USSR--a lot of heavy-duty machine tools. At present "Khayd" uses many types of machine tools of Soviet manufacture widely including plano-milling, vertical milling and turret-type machine tools. Over 20 percent of the export deliveries of the Austrian Firm is to the Soviet Union. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 82 p 22] 2291.

NEW MACHINE TOOL--Tests are being completed on the new miniature processing center called the IR-320 at the Ivanovo Machine Tool Association. Its small size earned it the name of "Malysh" [Baby]. "Malysh" is extremely versatile: it can grind, drill, polish and cut at high speeds and with the greatest precision. The tool attachments can be changed automatically. The IR-320 is unique. It is the first in a new generation of metalworking machines which are more productive than the multioperational programmed machine tool now in use. [Text] [MOSCOW NEWS in English No 1, 1983 p 10]

ROBOT PRODUCTION--Sterlitamak [Bashkir ASSR]--Production of robot manipulators has begun at the Sterlitamak Plant of High Precision Machine Tools for Device Bearings. They are designed to service turning, milling and grinding machine tools for machining cylindrical parts. About 900 units will be manufactured at the enterprise annually. [Text] [Moscow TRUD in Russian 15 Aug 82 p 1] 2291.

RAPIDLY READJUSTABLE FIXTURES--Saratov--The name of local innovator, M. Batrakhanov, winner of the USSR state bonus, is well known among machine builders in the city. To multiply, for example, the power of turning machine tools and raise their productivity, the experienced innovator proposed a readily readjustable fixture. What is its essence? It is possible to adjust the machine tool to manufacture any part in a few minutes. The fixture complex includes a collet chuck, a cassette tool holder, indicator devices for threading and a multiple blade cutting tool. All this makes it possible, without stopping the equipment, to set, fasten and remove parts, and work with high precision. The novelty is used widely at a number of enterprises in the oblast. Thus, in the Electric Machine Production Association where more than half the turning machine tools are equipped with it, productivity of each machine tool increased by 35 to 40 percent. [By A. Vorotnikov, PRAVDA correspondent] [Text] [PRAVDA in Russian 21 Jan 83 p 2] 2291.

ROBOT DEVELOPMENT--The INDUSTRIAL'NOYE ZAPOROZH'YE newspaper dedicated a special selection of materials to the results of an oblast competition for the best development and utilization of an industrial robot or manipulator. It old about the victors of the 1982 competition--the collectives of the "Kommunar" and "Yuzhgidromash" plants, the Zaporozhskiy Design Technological Institute of Agricultural Machinebuilding and others who developed and introduced into production technological robot complexes and manipulators, that made it possible to free workers and obtain a general economic effect counted in tens of thousands of rubles. What robots in production can give may be seen in the example of the Melitopol' Plant of Tractor Hydraulic Equipment. Five manipulators, 31 machine tools with numerical programmed control and a number of automatic lines are already in operation here. The introduction of modern equipment made it possible to mechanize the labor of 94 persons. In the current year, a complex of five automatic lines equipped with robots will be introduced at the plant. Results of the competition, writes the newspaper, not only make one glad, but also lead to thoughts on shortcomings in this work. In the 11th Five-Year Plan period, enterprises of the Zaporozhskaya Oblast planned to introduce up to 500 robots and manipulators. However, here, as in any new business, many problems arose. Thus, it is not only necessary to acquire or manufacture a manipulator, but also to train specialists and workers to use it and sometimes, introduce considerable changes in the technological process. The utilization of robots will be effective when the enterprises take a course in equipping sections, shops and entire complexes with robots. To do better and be more effective in this important work, the INDUSTRIAL'NOYE ZAPOROZH'YE editorial board decided to monitor the introduction of robot equipment at enterprises. In the selection, the first material was published in which the experience of a number of labor collectives was summarized and shortcomings in fulfilling the comprehensive program for reduction of manual labor were analyzed. [By B. Viktorov] [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 4, Jan 83 p 8] 2291.

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NEW GENERATION OF 'SENSORY ORGAN' MACHINE TOOLS DEVELOPED IN KIEV

Moscow IZVESTIYA in Russian 21 Nov 82 p 2

[Article by S. Tsikora, IZVESTIYA correspondent: "Automation Improves Skill"]

[Text] Every profession has its own trade secrets, and although true professionals never keep them secret, it turns out in practice that not everyone can imitate these labor procedures. The experts have certain particularly individualistic qualities, thanks to which the machine tools that they operate are amazingly obedient and steel is more pliable.

Contemporary science is unable to endow those who would desire them with these qualities on demand. Therefore a demand for the most highly qualified workers, which is growing from year to year, has compelled specialists to search for other ways to increase the quality of work on a large scale in the various sectors of production. Machine tools capable of "self-adjusting" [sposobnyye samonastraivat'sya] to turn out items of a required quality have arrived at metal working industries.

Priority in developing such machine tools belongs to the Soviet school of technologists. The most recent new product in this area are machine tools having "sensory organs." The new generation of such installations which permit quality control of mechanical material working was developed and incorporated by specialists of the Department of Instrument Making of Kiev Polytechnical Institute in collaboration with the Rostov-on-Don Institute of Agricultural Machine Building and a number of industrial enterprises. The invention is protected by 75 USSR patents.

"These installations," relates the director of operations, department head at KPI [Kiev Polytechnical Institute], professor V. Ostaf'yev, "gave machine tool workers the same power over metal that only individual virtuosi of their profession formerly had. Optoelectronic and vibroacoustic sensing devices connected to a mini-computer translated the individual sense of the experts when working with the metal into objective information. Thanks to their small dimensions, these sensing devices are easily affixed anywhere on an ordinary series-produced machine tool, without requiring design changes. Data input from them is analyzed by a microprocessor and constantly informs the work both of the work quality and the status of the cutting tool.

Incorporating these systems at a number of plants not only permitted the labor productivity of machine tool operators working with high-strength materials to be increased by a factor of 3-5 and the engineering reliability of the equipment to be improved by 60-70 percent, but it also made it possible for workers of average qualifications to produce items which formerly were entrusted only to experts.

The adaptive diagnostics and item quality control systems were particularly timely and in the right place at plants producing turbines and engines, airplanes and ships, automobiles, pumps and compressors. The introduction of "self-adjusting" machine tools and methods of optimum quality control over the working of high-strength materials permitted R12 million to be saved annually at just 5 enterprises in the Ukraine, and throughout the country, it provided an economic effect of R120 million per year. And almost 1500 of the most highly qualified machine tool operators were released to strengthen sectors which have not yet been automated.

"Equipping the machine tools with 'sensory organs'," said Ostaf'yev further, "brings the engineers closer to realizing one of their oldest dreams--the creation of enterprises with "human-free" technology. I think that the last two decades of the twentieth century will become a time when this dream emerges from the experimental stage and comes to be broadly realized in basic sectors of industry."

The level of modern electronic machinery freely permits us to entrust to them the control of a majority of industrial processes. The current generation of robot-manipulators is already capable of undertaking completely the task of machining items. Finally, there are machine tools which are self-adjusting to turn out parts of a prescribed quality. The stumbling block does not lie in the level of technology.

There are a number of social and psychological problems, before which the thought of the engineer checks its course. Workers with other specialties and qualifications, of which we are just now beginning to form an idea in our consciousness, will be needed by enterprises with human-free technology. These will be programmer-regulators, the primary duty of whom will be preventive inspection, change-over of the automatic lines and correction of operating programs. A large-scale change in workers and civil servant professions, improvment of qualifications, and new programs for education and training of specialists are becoming an inescapable result of this change. It is much more difficult to resolve problems of this type than purely technical problems since old habits and traditions die out significantly more slowly than new ones take hold.

But we have a mighty ally, time, which is moving faster during the epoch of the scientific and technical revolution. And that which is even today considered a matter difficult to resolve may tomorrow become work, both timely, and for the soul.

9194
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SEMIAUTOMATIC NC CHUCKER DEVELOPED

Moscow SOVIET REPORT in English No 5, 1982 p 55

[Article by K. M. Tarasov, general director, Ryazan Machine Tool Building Amalgamation: "Reaping the Benefits of International Division of Labor"]

[Text] Our Amalgamation with the Ryazan machine tool plant as its principal enterprise, is doing its best to utilize the advantages of international division of labour. We collaborate with socialist countries within the framework of the Comprehensive Programme for Socialist Economic Integration. Our products are fitted out with components coming from CMEA countries, and we, in turn, supply them with lathes of various makes. Another form of co-operation can be exemplified by our joint project with Czechoslovak colleagues, which involves engineering and building an NC turning centre. Many of its components will be made in Czechoslovakia.

Our co-operation with machine tool builders of industrially developed capitalist countries, such as Austria, Italy, Sweden, France, the FRG, Finland, is also promising. We believe it helps to keep abreast of the latest developments in machine tool engineering and to get a better knowledge of world market requirements. Take, for instance, our 1P756DF3 semiautomatic NC chucker, which has been redesigned jointly with Heid, an Austrian machine tool company. We displayed this machine at the Hannover exhibition in the FRG, and, according to experts from different countries, the machine meets all modern standards. Its manufacturing capabilities, tooling equipment, powerful drive and other features place it among the world's best of its kind.

This lathe incorporates a number of units and systems produced in Austria and some other West European countries.

The prototype, which was sent over to Heid a year ago, has shown efficient performance. Its stiffness and machining accuracy are commended by professionals. We have already launched the production of the 1P756DF3.

The successful experience makes it possible for us to further exploit the possibilities of this model. We are now planning for a new modification of the machine, an NC bar/chucker. Most likely, this work will also be done together with Heid.

I'd like to emphasize, that the company is our long-standing partner. For instance it has supplied us with chucks for the RT735F3 and RT745F3 machines specially designed to process couplings for casing pipes used in deep drilling.

The experience gained in our work with Heid has enabled us to embark on similar projects with other companies.

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